SPACE CENTER

Roundup

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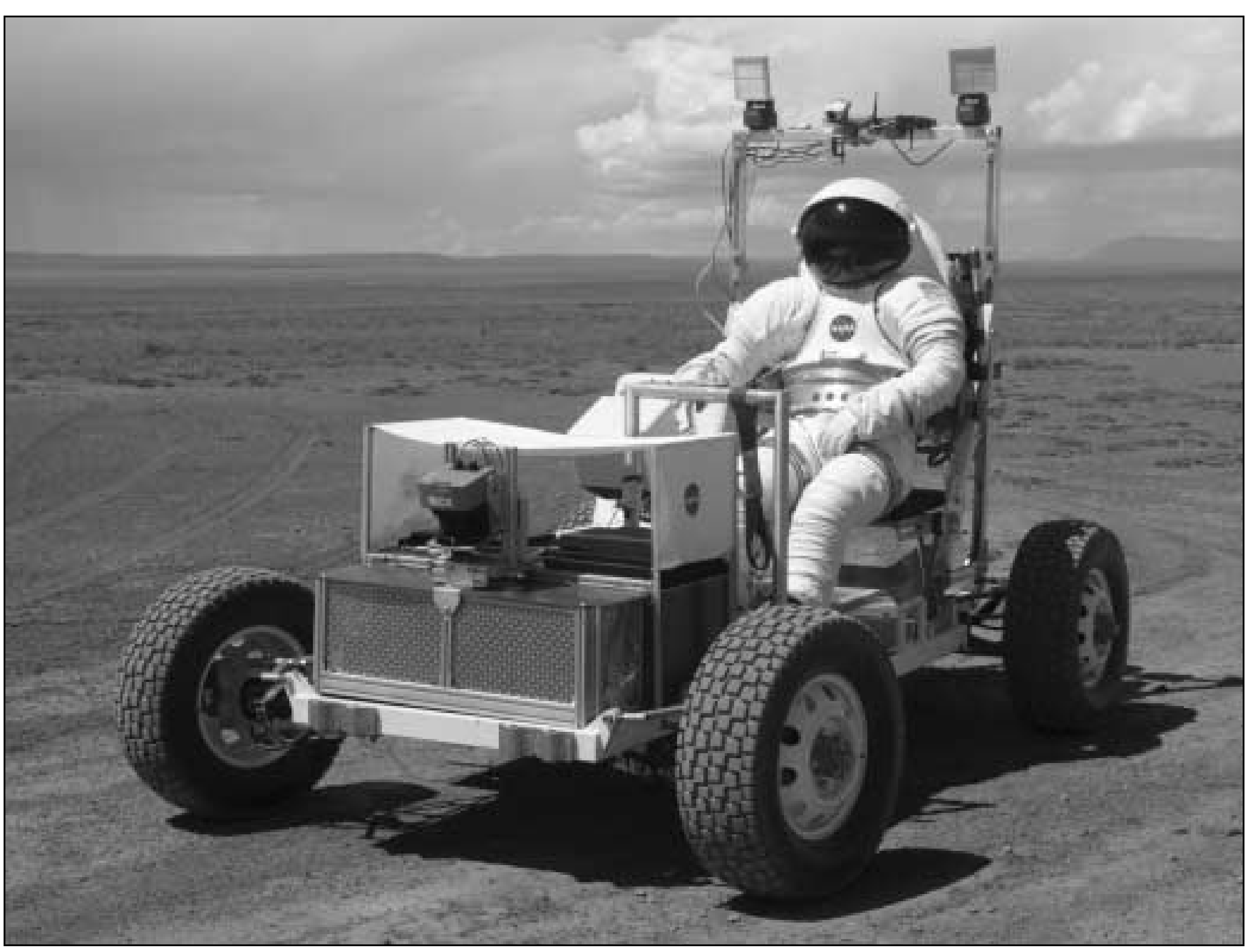

jsc2003e57466 and jsc2003e57386 Photos by Mark Sowa

Rock and Roll

Johnson Space Center's Dean Eppler of the Desert RATS 2003 makes his way across the Arizona desert during recent field tests involving two advanced spacesuits; the Science Crew and Utility Testbed; a robot named Boudreaux and the 1-G Apollo Lunar Rover Trainer.

For more information on the Desert RATS 2003, see pages 6-7.

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Director's Message

From the desk of Lt. Gen. Jefferson D. Howell Jr.

Holiday Reflections

During the holiday season, I find myself spending a lot of time thinking about the past. This is particularly true now that I've gotten to be an old guy.

As I think about the Thanksgivings and Christmases of my childhood, I almost start salivating because it reminds me of the great meals we would enjoy. My schoolteacher parents were of modest means, so most of the packages under the Christmas tree consisted of school clothes and other essentials for my sisters and me. We learned not to anticipate receiving many toys or frivolous gifts. However, there was always plenty of wonderful food!

My Aunt Annie Towns would normally join us for the holidays. She and Mother would spend hours in the kitchen preparing the holiday feasts. Our little house on Colorado Street in Victoria, Texas, would be filled with the scents of turkey and dressing, steaming pies (pecan for me, chocolate for my sister Joy) and other various and sundry goodies. Cousins and family friends would arrive in the afternoon and we would eat our fill while enjoying each other's company. I had no idea how poor we were because I was totally immersed in the warmth and love of my parents, family and friends. Life was good!

In that early period of my life, I didn't realize how fortunate I was to be surrounded by a loving family and loyal friends. As time has progressed, I have grown to appreciate that nothing, I mean NOTHING, is more important in one's life than family and friends. I have reaffirmed this truth through personal experience time and time again.

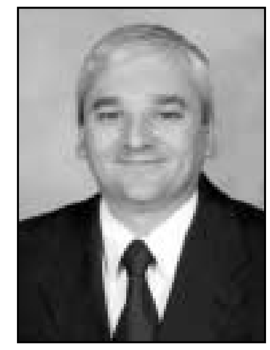
WHICH BRINGS ME TO MY POINT: I cannot properly express how thankful I am to be a part of NASA, the Johnson Space Center team and to be associated with all of you as we pursue our noble endeavor. That I can call you my friends and colleagues is an immense honor to me. Many of you tend to forget how very special you are. There are a select few places in this world where men and women have joined together to attempt achieving what has become routine to us. That we are at the focal point of human space exploration is even more special. Each of us, executing our tasks as best we know how, is an integral and important part of this incredible team! You, my friends, make me very proud and give me great happiness. Thanks, and…

HAPPY HOLIDAYS!

Beak sends…

APPEARING THIS MONTH IN OUR

Guest Space



NASA's influence bridges the age of flight and the space age

Kevin L. Petersen
Director, NASA Dryden Flight Research Center

A moment of introspection during this Centennial of Flight year shows how intertwined NASA is with the progress of flight, both in the air and in space. When NASA's forerunner, the National Advisory Committee for Aeronautics (NACA), was created by act of Congress in 1915, 12 years had elapsed since the Wrights' first flight, and the jury was still out on the utility of aviation. Yet only eight years after Alan Shepard made America's first suborbital hop in a Mercury capsule in May of 1961, human footprints compressed the surface of the Moon.

It's no accident that our Agency is called the National Aeronautics AND Space Administration. This isn't an either/or affair; since 1915, we've been expanding the boundaries of flight from the surface of the Earth into space. Early NACA forays codified flight phenomena and led to standards for aircraft design that helped enable one aeronautical revolution after another, including the transition into supersonic flight in 1947. This led us to hypersonic flight with the X-15 and exoatmospheric missions that earned astronaut wings for a number of X-15 pilots.

NACA engineers pioneered the airfoils and control-surface advancements that enabled supersonic flight in the late 1940s; a later visitation to this discipline by NASA engineers and research pilots gave the world the efficient supercritical wings and fly-by-wire technology that has enabled significant fuel economies, and the creation of vehicles like the vaunted B-2 and the Space Shuttle that would not be possible with manual controls. At NASA's Dryden Flight Research Center, our forebears tested the aerodynamics of steep descents using lifting body vehicles that enabled controlled landings to be made with spacecraft like the Space Shuttle.

It's a little like tracing DNA – open any book about any era of aerospace flight since 1915, and you can find the imprint of NASA inextricably woven into the matrix. During four long years of global combat in World War II, NACA minds at Langley, Lewis (now Glenn) and Ames addressed near-term aerodynamic and propulsion problems that helped make American aircraft war-winners. It was during the war that testers from Ames took advantage of the huge dry lakebed that now serves Dryden and Edwards Air Force Base. In the immediate postwar era, NACA established its High Speed Flight Station on the lakebed, evolving to become the Dryden Flight Research Center.

At Dryden, we practice a discipline that is part aeronautics and part astronautics as we help programs born at Johnson, Langley, Kennedy, Marshall and elsewhere validate the atmospheric portions of flight for vehicles destined to enter and return from space. And a uniquely appropriate flight program in this centennial year of aviation is our Active Aeroelastic Wing F/A-18 supersonic jet aircraft – a modern airplane modified to twist its wings for roll inputs, which is a method used by the Wright brothers a hundred years ago. The new version uses modern materials and computerized flight controls in a quest for improved maneuverability and flight efficiency, but its historic link to the Wright brothers provides us all a perspective on the genius of those two bicycle makers who gave the world flight.

NASA shares more than a circumstantial link with the Wrights – Orville Wright served on the National Advisory Committee for Aeronautics from 1920 to 1948, helping to give substance as well as inspiration to NACA for nearly three decades.

When the Space Shuttle returns to flight, all of NASA will stand proud. And in this Centennial of Flight year, all of NASA should also stand proud, acknowledging a heritage that reaches clear back to Orville and Wilbur Wright on the windy dunes of Kitty Hawk.

Return to Flight: Improved imagery systems to provide extra ‘eyes’ on orbiter

By Kendra Ceule

On future Shuttle flights, there may be nearly double the number of ground cameras focused on the vehicle during launch as there have been in the past – as well as new cameras onboard.

In a briefing held at Johnson Space Center on Sept. 16, experts informed the media of the proposed changes to the imagery system. The use of additional cameras, including three on the Shuttle itself, is intended to help experts on the ground quickly identify any potential problems – such as the piece of foam that struck *Columbia* when it launched and was later blamed for the heat-shield breach that destroyed the spacecraft during reentry. The sooner a possible problem is spotted, the sooner it can be addressed.

The view from one of the proposed Shuttle-based cameras might look familiar to viewers who watched the launch of STS-112 in October 2002.

“The External Tank camera will be the same as it was for STS-112, but will be moved to a new location,” said Christine Boykin, Aerospace Engineer in the Space Shuttle Program Systems Engineering and Integration Office. “The new view will include the bipod and the underside of the orbiter and its wings.”

Boykin said that “the current plan is to add cameras to the External Tank and to each Solid Rocket Booster,” providing up-close views of the vehicle during launch and entry into the atmosphere. These views would be supplemented by ground-based cameras: the pre-existing 12 and a proposed nine more.

The new cameras would include five new long-range trackers, for a total of 10; two new medium-range trackers, for a total of seven; and one new short-range tracker, for a total of three. The combination of different views and ranges ensures that the vehicle can be seen from as many angles as possible for as long as possible.

Each set of cameras has its strengths: For example, long-range cameras track the Shuttle longer than a short-range camera can, but the image is less precise as the distance increases. The short-range trackers provide the best detail of any of the ground-based cameras, but are so close to the vehicle – about 1,300 feet away – that it takes two of them to capture an image of the entire Shuttle.

Night launches are another concern for imaging teams. The dark launches are “very difficult because you have to look through the Shuttle’s (exhaust) plume to see the vehicle,” said Bob Page, Intercenter Photography Working Group Chairman.

While adhering to a daylight-only launch schedule will dramatically reduce the number of launch windows, it will enable better and more detailed imagery of each launch – allowing potential problems to be seen and solved that much sooner.

Also participating in the briefing were John Muratore, Manager of Space Shuttle Systems Engineering and Integration, and Dena Hayes, Camera Project Manager for JSC’s Avionic Systems Division.

In Cocoa Beach, Fla., a new five-meter telescope is lowered toward the dome for installation.
KSC-03PD-2678

(Top inset) A worker looks at a five-meter (focal length) telescope being removed for repair. As part of the Distant Object Attitude Measurement System, the tracking telescope provides optical support for launches from Kennedy Space Center and Cape Canaveral.
KSC-03PD-2673

(Left) Workers calibrate a tracking telescope.
KSC-03PD-2504
All photos this page courtesy of Kennedy Space Center

Centennial of Flight

A CENTURY OF ACHIEVEMENT

By Joanne Hale

(Top) The Wright Brothers' first motor-powered flight at Kitty Hawk, N.C.

Here is a 1953 photo of some of the research aircraft at the NACA High-Speed Flight Research Station (now known as the Dryden Flight Research Center). The photo shows the X-3 (center); clockwise from left are the X-1A, the third D-558-1, XF-92A, X-5, D-558-2 and X-4.

Pilot Bill Dana looks up as the B-52 'mothership' cruises over NASA's HL-10 'lifting' body on Muroc Dry Lake, Calif., in 1969. Lifting bodies are wingless vehicles that fly because of the lift generated by the aircraft's body. The research proved that future spacecraft could land like an airplane, helping to pave the way for the development of the Space Shuttle.

Photo Credit: NASA/Dryden Flight Research Center

These two pages provide a brief look at NASA's significant contributions to the advancement of flight over the past 100 years. The information was compiled from the recent NASA publication Celebrating a Century of Flight.

In the publication, NASA Administrator Sean O'Keefe wrote, "NASA's Vision for the next century of flight – to improve life here, extend life to there, and find life beyond – compels us to improve and create all types of aircraft, better understand Earth's climate, probe the universe's mysteries, and send explorers to the planets. This celebration of the Centennial of Flight reminds all of us how privileged we are to be engaged at just the start of an adventure without end."

To read more in-depth about NASA's involvement in the past 100 years of flight in the Celebrating a Century of Flight *publication, please visit* http://history.nasa.gov/SP-09-511.pdf.

The Wright Brothers: Success!

The great moment arrived on the windy winter morning of Dec. 17, 1903, on a North Carolina beach, the result of the work of two brothers with a passion for bicycling and an insatiable curiosity.

Orville Wright made the first flight at about 10:35 a.m. – a bumpy and erratic 12 seconds in the air. The Wright brothers introduced the era of powered flight, and men and women everywhere were anxious to follow them into the air. Steady improvements in the design of engines and aircraft structures produced a new generation of aircraft capable of flying higher, faster and farther.

NACA: A Tradition of Excellence

Spurred by the beginning of World War I and a heightened interest in aviation research, the U.S. Congress created the National Advisory Committee for Aeronautics (NACA) in 1915. In its early days, NACA concentrated on problems related to military aviation. When the war ended, however, the engineers of the newly constructed Langley Memorial Aeronautical Laboratory in Hampton, Va., turned their attention to the solution of a broad range of problems in flight technology.

During the 1920s and 1930s, NACA engineers built a reputation for excellence in research and achieved a host of critical breakthroughs resulting in increased performance. The NACA contributed to victory in World War II and pioneered the postwar research that transformed the airplane into a high-speed, high-altitude aerospace vehicle.

NACA would expand to encompass three research centers: Langley, Ames Research Center in California and Lewis Research Center in Ohio. By 1958, these centers would employ more than 8,000 people with a budget of more than $117 million. The NACA centers would contribute to the development or improvement of every American aircraft produced during this time.

NACA engineers and scientists were responsible for the basic and applied research that led to the development of aircraft structures, safety, fluid dynamics, aerodynamics, ground test facilities, flight testing and high-speed flight from theory to practice. NACA made advancements and contributions in every field associated with aeronautics and the fledgling field of spaceflight.

Higher and Faster

After the first successful supersonic flight in 1947 by Air Force Test Pilot Captain Chuck Yeager, several milestones were accomplished by research pilots flying aircraft designed to test the boundaries of speed and altitude. Later, the Navy and NACA developed the D-558, which first flew Mach 2 on Nov. 30, 1953. Research on the Bell X-2 of the mid-1950s resulted in advanced materials for high-speed aircraft such as the XB-70 bomber, the SR-71 spy plane and the Space Shuttle.

Dawn of the Space Age

The National Aeronautics and Space Administration (NASA) was formed with President Dwight D. Eisenhower's signing of the National Aeronautics and Space Act of 1958. The NACA and parts of other agencies formed its core; its purpose was research and development for the exploration of space.

Beginning in the early 1960s, NASA partnered with the Air Force and other organizations and developed and flew a series of prototypes of future spacecraft that could land like an airplane after reentering the atmosphere – as the Space Shuttle does today.

To the Moon: Apollo

As an effort to offset world perception of Soviet leadership in space and technology, Pres. John F. Kennedy made a public commitment on May 25, 1961, to land an American on the Moon by the end of the decade. Apollo 11 made the epic voyage. On July 20, 1969, the Lunar Module, with Astronauts Neil A. Armstrong and Buzz Aldrin aboard, landed on the lunar surface while Michael Collins orbited overhead in the Apollo Command Module. These astronauts were the first humans ever to reach another world.

The Apollo program left several important legacies: It accomplished its political goals; it was a triumph of enormously difficult systems engineering and technological integration; it provided lunar samples for decades of scientific research; and it enabled the people of Earth, for the first time, to see their home from afar – a tiny, lovely and fragile "blue marble" hanging in the blackness of space.

Flying to and from Earth orbit: The Space Shuttle Launch Systems

As the Apollo missions came to a close, NASA's major effort in human spaceflight involved the development of a reusable Space Shuttle that could travel back and forth between Earth and space more routinely and economically than had ever been done before. On April 12, 1981, the first operational orbiter, *Columbia*, was launched from the Kennedy Space Center in Florida.

In the beginning of the 21st Century, the Space Shuttle is still the only vehicle in the world with the capability to deliver and return large payloads to and from orbit. Since 1981, the Space Shuttle has launched 113 times and remains one of the most impressive technologies in American history.

Space Stations past and present

Space exploration enthusiasts have long believed that a permanently occupied space station was a necessary outpost in the new frontier of space. NASA deferred this project during Project Apollo, but on May 14, 1973, it launched a small orbital space platform called Skylab. During 1973, Skylab became home to three crews, who conducted experiments on solar astronomy, Earth resources and medical studies. At the conclusion of Skylab 4, the orbital workshop was powered down and allowed to burn up on reentry in 1979. Skylab served as a predecessor for a full-fledged space station.

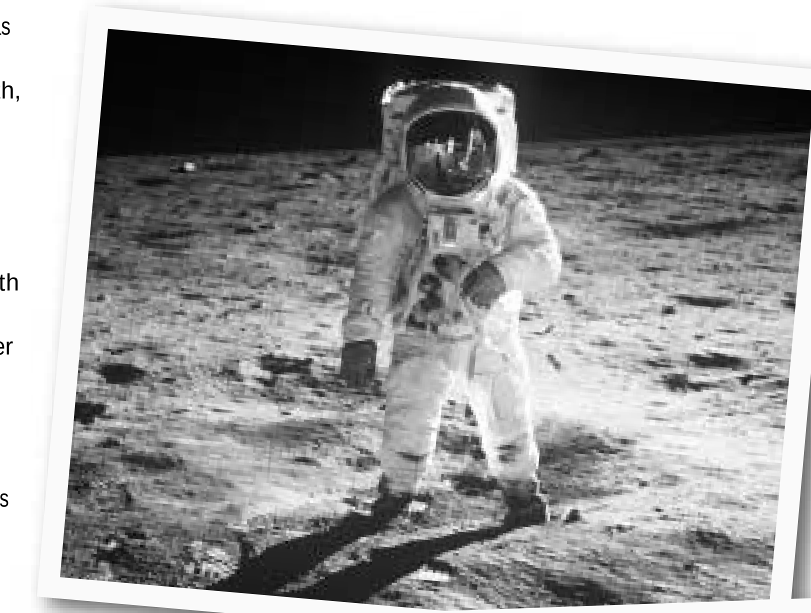
In 1984, the development of a new, permanently occupied space station was begun. The United States joined with 15 other nations to create this research outpost. In December 1998, the first elements of the International Space Station were assembled in orbit. A succession of missions has since continued the construction.

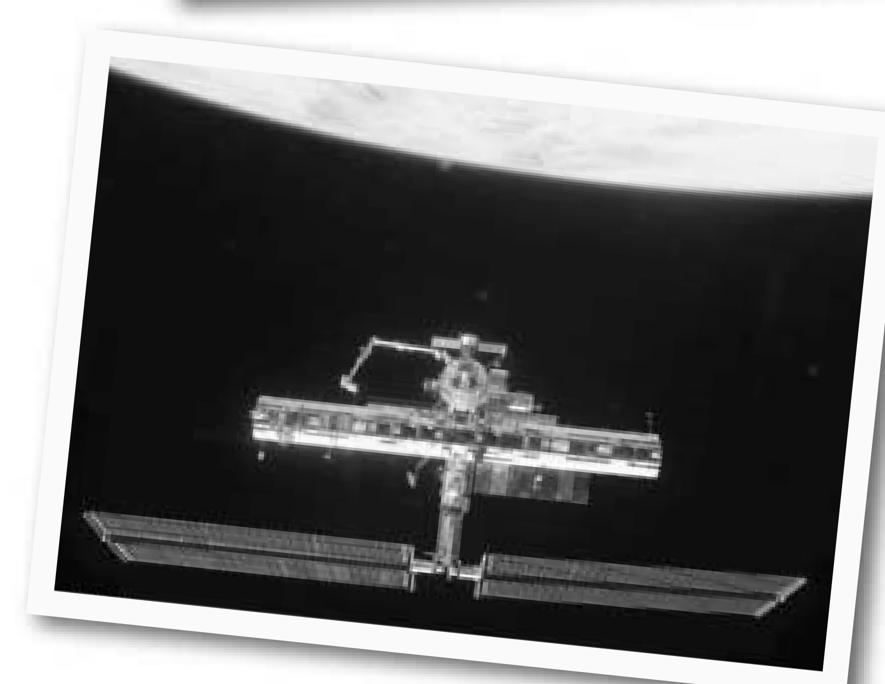
The Future of Flight

Working with airlines and industry leaders, NASA is developing new technologies that will bring about improved safety and larger aircraft that transport more passengers using less fuel. New systems and tools for pilots and air traffic controllers will enable airlines to increase the number of flights while dramatically decreasing delays. Business and personal travel could benefit from this change with more choices and lower fares. Improvements to systems that support small and personal aircraft could lead to a future in which personal planes are used much like today's automobiles.

Future Launch Systems

In the early days of flight in the 20th Century, the U.S. government fostered aviation. As the nation marks the 100th anniversary of powered flight, NASA is continuing this historic tradition with an investment in the development of future launch systems. This will ultimately help move the nation from the pioneering era of the Mercury, Gemini, Apollo and Space Shuttle programs to a future in which people are more routinely traveling, working and living in space.





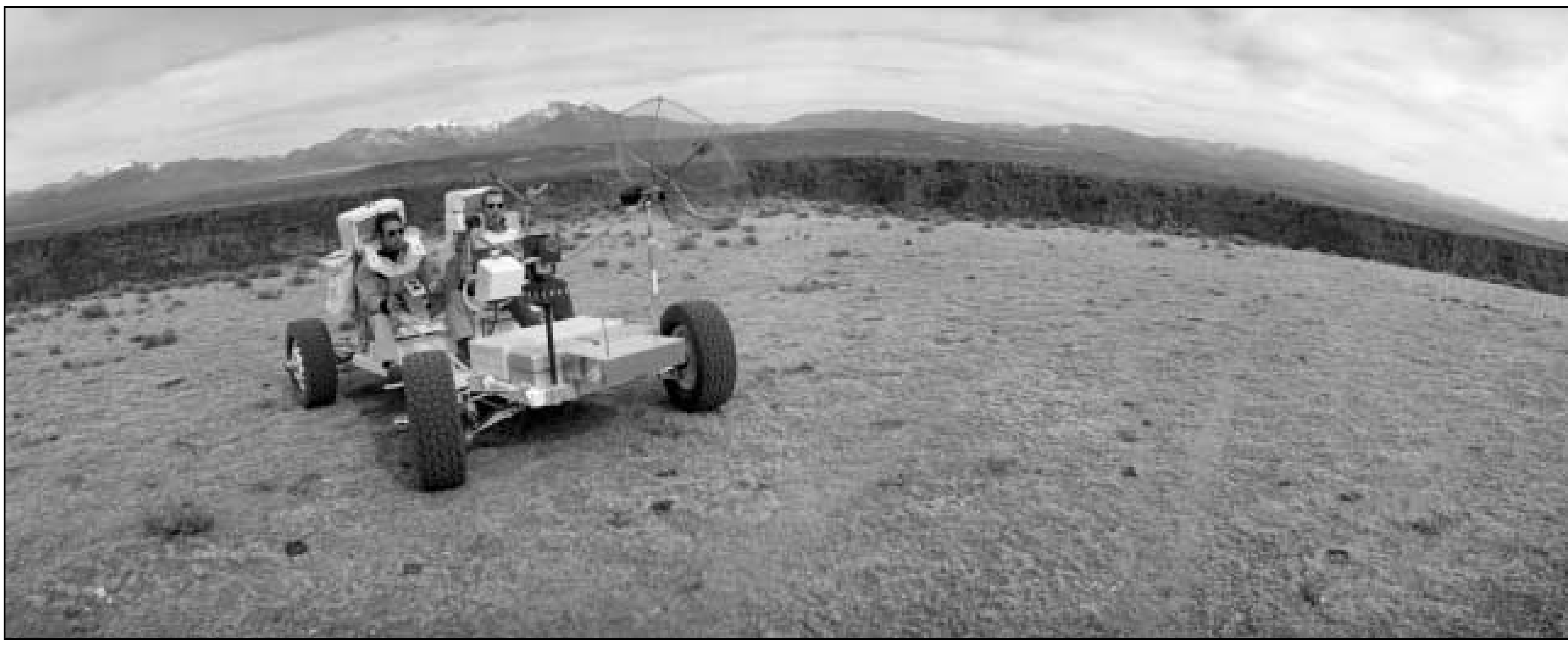
(Top) Astronaut Edwin E. Aldrin, Jr., lunar module Pilot, walks on the surface of the Moon near the leg of the Lunar Module (LM) 'Eagle' during the Apollo 11 spacewalk. Astronaut Neil A. Armstrong, Commander, took this photograph with a 70mm lunar surface camera. While Astronauts Armstrong and Aldrin descended in the LM to explore the Sea of Tranquility region of the Moon, Astronaut Michael Collins, command module Pilot, remained with the Command and Service Modules in lunar orbit.

Space Shuttle *Atlantis* leaps from the steam and smoke billowing across launch pad 39B after liftoff at 3:46 p.m. EDT at Kennedy Space Center on mission STS-112.

On Oct. 31, 2000, the first crew left Earth to set up residence aboard the International Space Station; and with this accomplishment, the spacefaring nations of the world intend that no future generation will ever know a time when there is not some human presence in space. The Space Station promises to become the anchor tenant of a research park in space, contributing critical knowledge necessary to make life on Earth more rewarding and to aid humanity's movement beyond this planet.

Space Rats test technology in the desert

By Joanne Hale



In this March 11, 1971, photo, Apollo 15 Commander David R. Scott (left) and Lunar Module Pilot James B. Irwin ride in the Lunar Roving Vehicle trainer called 'Grover' during a simulation of lunar surface extravehicular activity in the Taos, N.M., area. This rover was obtained from the U.S. Geological Survey Organization in Flagstaff, Ariz., for use in the recent field testing at Meteor Crater.

s71-23774

RATS took over the barren terrain of Flagstaff, Ariz., recently as Johnson Space Center engineers embarked on one of their latest missions – Desert Research and Technology Studies (RATS) 2003.

Under the guidance of Senior Project Engineer Joe Kosmo of the Crew and Thermal Systems Division, team members from JSC and Glenn Research Center coordinated and conducted a series of robotic, rover and advanced spacesuit interactive tests in remote locations in Arizona. These field tests enabled the teams to try out surface exploration tasks that could be performed on another planet someday.

The technologies involved in the two-week test were the Extravehicular activity Robotic Assistant (ERA), the Science, Crew and Operations Utility Testbed (SCOUT), the Science Trailer and two advanced spacesuit configurations. Below, the engineering teams describe their role in Desert RATS 2003.

Boudreaux: the Extravehicular activity Robotic Assistant

The ERA project team has developed a fully autonomous mobile robotic testbed for exploring astronaut-robot interaction. During an excursion on a planetary surface, the six-foot-tall, 400-pound robot named Boudreaux could hold a conversation with an astronaut using natural language and speech synthesis technology.

Boudreaux travels at one meter per second and is fully equipped with dual differential Global Positioning System (GPS) units, a laser range finder, an inertial measurement unit with compass, two pan-tilt platforms with color cameras and a robotic arm with three-fingered hand.

The astronaut can command the robot into several autonomous modes. Boudreaux can perform tasks such as tracking, following an astronaut or other mobile agent, performing a solo scouting mission, mapping terrain and collecting science data over a search pattern. It can also deploy payloads such as science instruments, solar panels and power lines.

During the Desert RATS 2003 field tests at Meteor Crater, Ariz., Boudreaux successfully performed an autonomous science collection task by pulling a spectroradiometer instrument along a specified search pattern. Boudreaux also pulled a geology trailer for the astronaut, facilitating the on-site analysis and curation of rock samples, and provided camera pan-tilt control and video feedback from Meteor Crater to JSC via satellite.

Submitted by the ERA team: Kimberly Tyree, Nathan Howard, Robert Hirsh and technical lead Jeffrey Graham of Titan.

Science trailer, a roving geological field lab, is able to crawl over football-sized rocks with ease. The trailer is being pulled by Boudreaux, a six-foot tall, 400-pound robot.

jsc2003-00485

SCOUT: the Science, Crew and Operations Utility Testbed

SCOUT is a technology- and power-rich crewed utility vehicle testbed that draws several existing Engineering Directorate activities into one common program. It is a multipurpose rover that will support the development and demonstration of various technologies, operations and mission concepts.

The three-year SCOUT program recently completed its first field test at Meteor Crater. To serve as the vehicle for SCOUT, the team used a modified 1-G Apollo Lunar Rover Trainer. The rover was obtained by JSC from the U.S. Geological Survey Organization in Flagstaff, Ariz., and was modified to include a hybrid battery/fuel cell power system and advanced technologies including GPS and laser obstacle detection. Numerous test drives were completed, including a night illumination study, and two space-suited drivers took turns evaluating rover handling and ergonomics during analog science missions.

SCOUT provides young engineers with hands-on experience in systems and operations, while fulfilling JSC's role as Lead for Human Exploration and Robotic/Human Interaction. It also fosters cooperative development and Space Act agreements with other government agencies, industry and academia.

Submitted by the SCOUT team: Bill Studak, Tom Simon, Kerri McCurdy, Kris Romig, Rafael Jimenez, Keith Blizzard, Jen Rochlis, Dave Fletcher, Warren Tyree, Chip Kroll, Steve Hoffman, Richard Pedersen, Mike Ruiz and Dave Saley.

Members of the SCOUT team with the 1-G Apollo Lunar Rover Trainer, Mike Ruiz, Kerri McCurdy, Tom Simon and Keith Blizzard. Sitting are Kris Romig, Bill Studak and Rafael Jimenez.

jsc2003e57324

Science Trailer

The Science Trailer is a one-stop field geology station that has been in use for Advanced Suit Lab field exercises for a couple of years, both at JSC and in Arizona. The general concept is to provide a roving geological field lab for the suited astronaut. It has always had the familiar geology "pick and shovel" instruments, as well as a power rock crusher to open samples and get to the "good stuff" inside. This second-generation roving lab has four-wheel independent suspension able to crawl over football-sized rocks with ease while keeping the lab platform and equipment relatively stable.

Equipment now onboard includes:

- front and rear video and infrared video for viewing and documenting the site being explored
- battery power with solar panel charging
- self-contained rock analysis chamber with halogen and ultraviolet lighting that projects onto the chosen sample
- QX3 computer microscope for inspection of rock samples

The sample is placed on a motorized turntable and viewed via an internal camcorder or the video microscope on a laptop display. This imagery can be stored and then transmitted to a base station along with verbal commentary by the astronaut.

The development and construction process intermittently involved the whole Advanced Suit Lab staff over a few months. Nathan Smith was primarily responsible for designing and building the trailer and the rock sample chamber. Various hardware and equipment mounting was accomplished by the rest of the lab staff. Shawn Davis, a cooperative education student in the lab, was instrumental in putting all of the wiring together and getting it to behave with the computer.

Submitted by the Science Trailer team: Joe Kosmo, Bill Welch, Edward Ehlers, Amy Ross and Barbara Janoiko.

Advanced Spacesuits

Two different advanced spacesuits were tested in Arizona:

- The MK III hybrid spacesuit, which combines a variety of lightweight composite torso elements with fabric and rotary bearing mobility joint systems. This suit represents the latest version of various advanced technology spacesuit mobility and structural elements that NASA has been extensively testing and evaluating over the past six years.
- The I-1 suit, developed for NASA by ILC Dover, Inc. This particular configuration incorporates an all-fabric torso and uses a limited number of rotary bearing elements in the shoulder, arm and hip joints.

Submitted by Joe Kosmo.

Kevin Groneman, wearing the I-1 spacesuit, is pictured here with the EC-5 Science Trailer near the edge of Meteor Crater in Arizona.

jsc2003e57480

JSC engineers perform interactive testing at remote site near Flagstaff, Ariz.

jsc2003e57482

Pictured above is a close-up view of the EC-5 Science Trailer.

jsc2003e57474

All Desert RATS 2003 photos in this story by Mark Sowa

Eileen Collins honored with Society of Women Engineers' Resnik Challenger Medal

By Joanne Hale

Astronaut Eileen Collins recently received the 2003 Society of Women Engineers' (SWE) Resnik Challenger Medal in recognition of her visionary contributions to space exploration and her extraordinary leadership and flight skills.

Collins said that receiving the award was "a real honor" and that SWE and the space program share similar goals when it comes to education.

"I believe one of the goals of the SWE is to inspire and recruit young women into engineering fields," Collins said, adding that "the space program is a great way to inspire young people to get into engineering as well as science and math."

SWE, founded in 1950, is a nonprofit educational and service organization that focuses on establishing engineering as a highly desirable career field for women. SWE also recognizes women's contributions and achievements as engineers and leaders.

The Resnik Medal, named after Astronaut Judy Resnik who died in the 1986 *Challenger* accident, was formally presented to Collins Oct. 10 at the SWE National Achievement Awards banquet in Birmingham, Ala. Collins could not attend in person but accepted the award in a videotaped speech.

Collins became the first woman to pilot a Shuttle mission in 1995 aboard STS-63 and also the first woman Shuttle commander in 1999 aboard STS-93. As a real-life space explorer, she inspires young people around the world. However, she credits more down-to-earth leaders with keeping kids – especially girls – interested in science, math and engineering.

"Young women shy away from those fields – whether or not it is due to peer pressure or society expectations," she said. "I would like to get a message out to parents and teachers: You are the ones that need to tell young people 'yes, you can do it.'"

Collins said that her own parents and teachers were her role models as she grew up, along with the Women Airforce Service Pilots of World War II and the first group of women Mission Specialists selected by NASA in 1978.

Collins herself was selected by NASA in 1990 after graduation as class leader from the Air Force Test Pilot Training School at Edwards Air Force Base.

"Thousands of today's young women have been inspired by Colonel Collins," SWE president Alma Martinez Fallon said. "Colonel Collins' influence and encouragement in getting students, especially girls, involved in math and science is vital to addressing our country's essential need for a growing and diverse technical workforce."

PHOTOS, CLOCKWISE

Collins observes training activities of her STS-114 crewmates from the simulation control area in the Neutral Buoyancy Laboratory (NBL).
jsc2002-e-23144 Photo by James Blair

Collins, STS-93 Commander, checks on an experiment on *Columbia's* middeck on July 23, 1999. This Shuttle mission was the first to be commanded by a woman.
s93-e-5016

Collins dons a training version of the Shuttle launch and entry suit prior to the start of an STS-114 training session in the NBL. She will serve as Commander of STS-114, the first post-*Columbia* Shuttle flight.
jsc2002-00842 Photo by James Blair

SPACE CENTER
Roundup

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